

What is claimed is:

1. A bi-directional transceiver module which respectively transmits and receives a transmitting optical signal and a receiving optical signal through a line of optical fiber, the transceiver module comprising:

5 a $1.3\ \mu\text{m}$ Distributed Bragg Reflection Laser Diode (DBR LD), which includes an active layer which performs light-emission in response to a light at $1.3\ \mu\text{m}$ and a DBR mirror formed near the active layer;

a monitoring Photo-Diode (PD), which has a predetermined energy band gap to absorb a light with a wavelength of $1.3\ \mu\text{m}$ and transmits a light with a wavelength
10 of $1.55\ \mu\text{m}$;

an optical signal detection PD, which has a predetermined energy band gap to absorb a signal with a wavelength of $1.55\ \mu\text{m}$;

an insulated area, which electrically isolates the $1.3\ \mu\text{m}$ DBR LD, the monitoring PD, and the optical signal detection PD, respectively;

15 a p-electrode, which is formed in the $1.3\ \mu\text{m}$ DBR LD, the monitoring PD, and the optical signal detection PD, respectively; and

a n-electrode, which is a common electrode.

20 2. The bi-directional transceiver module of claim 1, wherein the DBR mirror has a reflection rate of 95 through 99%.

3. The bi-directional transceiver module of claim 1, further comprising an InGaAsP semiconductor layer formed near the $1.3\ \mu\text{m}$ DBR LD, to completely absorb a signal with a wavelength of $1.3\ \mu\text{m}$ reflected from the DBR mirror.

25 4. The bi-directional transceiver module of claim 3, wherein the InGaAsP semiconductor layer has an energy band gap of 0.85 through 0.9 eV.

5. The bi-directional transceiver module of claim 3, wherein the InGaAsP semiconductor layer is formed near the active layer by a regrowth using a butt-joint method.
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6. The bi-directional transceiver module of claim 1, further comprising an InGaAs optical detection layer formed near the monitoring PD, to absorb a downstream optical signal with a wavelength of $1.55\ \mu\text{m}$.

5 7. The bi-directional transceiver module of claim 3, further comprising an InGaAs optical detection layer formed near the monitoring PD, to absorb a downstream optical signal with a wavelength of $1.55\ \mu\text{m}$.

10 8. The bi-directional transceiver module of claim 1, wherein the insulated area is formed using a chemical etching method or an ion implantation method.

9. A method for operating a bi-directional transceiver module according to claim 1, in order to transmit a transmitting optical signal and a receiving optical signal simultaneously through a piece of optical fiber, the method comprising:

15 applying a forward bias (+) to the p-electrode formed on the $1.3\ \mu\text{m}$ DBR LD;
applying a backward bias (-) to the p-electrode formed on the monitoring PD and the optical signal detection PD; and
grounding the n-electrode.